



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,621	07/25/2006	Hubert Moriceau	(BIF 116044 US)	2319
Brinks Hofer Gilson & Lione PO Box 10395 Chicago, IL 60610				
			EXAMINER	
PATEL, REEMA				
		ART UNIT		PAPER NUMBER
2812				
		MAIL DATE		DELIVERY MODE
02/11/2008 PAPER				

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/565,621

**Applicant(s)**

MORICEAU ET AL.

**Examiner**

Reema Patel

**Art Unit**

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-28 and 30-41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-28 and 30-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 January 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB08)
- Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

This action is in response to an amendment filed 11/14/07.

#### ***Claim Objections***

1. Claims 1, 26-28, and 29-40 are objected to because of the following informalities:  
The preamble of these claims have misspelled the word 'stacked' as 'stackeded'.  
Appropriate correction is required.
2. Claim 16 is objected to because of the following informalities: This claim is missing comma separators. Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 3-5, 12, 15, 21-28, 30, 36-39 are rejected under 35 U.S.C. 102(b) as being anticipated by Henley et al. (U.S. 6,146,979; hereinafter 'Henley').
5. Regarding claims 1 and 26, Henley discloses a method of fabricating a stacked structure comprising:

- a) Selecting a first plate (10, Fig. 11) and a second plate (53, Fig. 14) such that a portion of at least one of the first and second plates has a structured surface (1116, Fig. 11) (col 7, line 62 – col 8, line 3);
  - b) Producing a sacrificial layer (114, Fig. 13) on at least a portion of the surface of the first plate or the surface of the second plate (col 8, lines 4-13, 59-62);
  - c) Bonding the first and second plates together by bonding the sacrificial layer to a remaining first or second plate, wherein the structured surface contacts the sacrificial layer (col 8, lines 49-50; Fig. 14).
6. Regarding claim 3, Henley discloses the plates have predetermined physical-chemical properties (col 8, line 63 – col 9, line 1).
7. Regarding claims 4-5, Henley discloses the structured surface has a surface roughness of greater than 0.2 nm root-mean-square (RMS) (col 7, lines 63-66, col 4, lines 35-37).
8. Regarding claim 12, Henley discloses smoothing the free surface of at least one of the plates before bonding (col 8, lines 10-14).
9. Regarding claim 15, Henley discloses bonding with a sacrificial bonding agent (col 8, lines 40-41, 49-50; Fig. 14).
10. Regarding claim 21, Henley discloses that the first plate may be removed by thinning (col 8, lines 23-26).
11. Regarding claim 22-23, Henley discloses at least one of the plates comprises a silicon semiconductor material (col 8, line 63 – col 9, line 1).

12. Regarding claims 24-25, Henley discloses the sacrificial layer comprises silicon oxide (col 8, lines 40-41) or a polymer (col 8, lines 10-14).

13. Regarding claims 27-28 and 30, Henley discloses a stacked structure comprising a sacrificial layer (114, Fig. 14) between a first substrate (10, Fig. 14) and a second substrate (53, Fig. 14), the substrates having predetermined physical-chemical properties (col 8, line 63 – col 9, line 1), wherein at least a portion of at least one of the first or second substrates comprises a structured surface (1116, Fig. 14), wherein the structured surface comprises a surface having a roughness greater than 0.2 nm (col 7, lines 63-66, col 4, lines 35-37).

14. Regarding claims 36-37, Henley discloses a major portion at least one of the plates comprises a silicon semiconductor material (col 8, line 63 – col 9, line 1).

15. Regarding claims 38-39, Henley discloses the sacrificial layer comprises silicon oxide (col 8, lines 40-41) or a polymer (col 8, lines 10-14).

16. Claims 1-2, 6-10, 13, 16, 18, 27, 31-34, and 41 are rejected under 35 U.S.C. 102(b) as being anticipated by Enquist (U.S. 2003/0119379 A1).

17. Regarding claim 1, Enquist discloses a method of fabricating a stacked structure comprising:

- a) Selecting a first plate (10, Fig. 2) and a second plate (16, Fig. 3) such that a portion of at least one of the first and second plates has a structured surface ([0062], [0065]);

- b) Producing a sacrificial layer (12, Fig. 2) on at least a portion of the surface of the first plate or the surface of the second plate ([0063]);
  - c) Bonding the first and second plates together by bonding the sacrificial layer to a remaining first or second plate, wherein the structured surface contacts the sacrificial layer ([0065]; Fig. 3-4).
18. Regarding claim 2, Enquist discloses both plates contain structured surfaces ([0062], [0065]; Fig. 3).
19. Regarding claims 6-10, Enquist discloses at least one of the plates initially includes a surface layer (17, Fig. 3) comprises a monocrystalline or silicon containing predetermined properties ([0063], [0065]).
20. Regarding claim 13, Enquist discloses smoothing the free surface of the sacrificial layer and the free surface of at least one of the plates before bonding ([0062], [0065]).
21. Regarding claims 16 and 18, Enquist discloses bonding assisted by a thermal treatment atmosphere ([0065]).
22. Regarding claim 27 discloses stacked structure comprising a sacrificial layer (12, Fig. 4) between a first substrate (10, Fig. 4) and a second substrate (16, Fig. 4), wherein at least a portion of at least one of the first or second substrates comprises a structured surface, wherein the structured surface comprises a surface having a roughness greater than a predetermined value ([0062]-[0065]).
23. Regarding claims 31-34, Enquist discloses at least one of the plates initially includes a surface layer (17, Fig. 3) comprises a monocrystalline or silicon containing predetermined physical-chemical properties ([0063], [0065]).

24. Regarding claim 41, Enquist discloses producing a supplemental sacrificial layer (17, Fig. 3) on the remaining first or second plate ([0063], [0065]).
25. Claims 1, 6, 9, 11, 17, 27, 31, 34-35, and 40 are rejected under 35 U.S.C. 102(e) as being anticipated by Tong et al. (U.S. 6,902,987 B2; hereinafter 'Tong').
26. Regarding claims 1 and 27, Tong discloses a method of fabricating a stacked structure comprising:
- a) Selecting a first plate (30, Fig. 3A) and a second plate (35, Fig. 3D) such that a portion of at least one of the first and second plates has a structured surface with a roughness greater than a predetermined threshold (col 4, line 58 - col 5, line 5);
  - b) Producing a sacrificial layer (33, Fig. 3A) on at least a portion of the surface of the first plate or the surface of the second plate (col 5, lines 5-15);
  - c) Bonding the first and second plates together by bonding the sacrificial layer to a remaining first or second plate, wherein the structured surface contacts the sacrificial layer (col 6, lines 58-65; Fig. 3E).
27. Regarding claims 6, 9, 11, 31, 34, and 35, Tong discloses that one of the plates initially includes a surface layer (36, Fig. 3D) comprising silicon nitride with predetermined properties (col 6, lines 19-24, 58-65; col 5, lines 5-15).
28. Regarding claim 17, Tong discloses applying a selected atmosphere prior to bonding (col 5, lines 57-64; Fig. 3C).
29. Regarding claim 40, Tong discloses at least one of the first or second substrates comprises a thin layer (col 4, line 58 - col 5, line 5).

***Claim Rejections - 35 USC § 103***

30. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

31. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Henley et al. (U.S. 6,146,979; hereinafter 'Henley') as applied to claim 1 above, and further in view of Maleville et al. (U.S. 6,429,094 B1; hereinafter 'Maleville').

32. Regarding claim 14, Henley discloses that the substrates are bonded together but does not disclose that such a procedure is done via molecular bonding. However, Maleville discloses the use of molecular bonding in forming an SOI-type substrate (col 3, lines 51-54) since it allows for a strong bond between two substrates and enables un-bonding of the substrates along the bonding interface (col 3, lines 38-42). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Henley with bonding by molecular bonding, as taught by Maleville, so as to achieve a strong bond between two substrates while also enabling un-bonding of the substrates along the bonding interface.

33. Claims 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Enquist (U.S. 2003/0119379 A1) as applied to claim 16 above, and further in view of Habberger et al. (U.S. 6,417,075 B1; hereinafter 'Habberger').

34. Enquist does not disclose exposing the wafers to an open air environment before or during bonding. However, Habberger discloses exposing wafers to an open air



environment so as to form a natural oxide layer which serves as a bonding area (col 4, lines 61-64). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Enquist with exposing the wafers before and during bonding to an open air environment, as taught by Habegger, so as to form a natural oxide on the wafer which serves as the bonding area.

### ***Response to Arguments***

35. Applicant's arguments with respect to claim 1-28 and 30-41 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Art Unit: 2812

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Reema Patel whose telephone number is (571)270-1436. The examiner can normally be reached on M-F, 8:00-4:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on 571-272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RSP  
2/1/08

/Michael S. Lebentritt/  
Supervisory Patent Examiner, Art Unit 2812